

ABSTRACT

A spectroscopy system is provided which operates in the vacuum ultraviolet spectrum. More particularly, a system utilizing reflectometry techniques in the vacuum ultraviolet spectrum is provided for use in metrology applications. To ensure accurate and repeatable measurement, the environment of the optical path is controlled to limit absorption effects of gases that may be present in the optical path. The VUV reflectometer may be utilized to monitor a wide range of data in a semiconductor processing environment. For example, the techniques may be used for measuring thicknesses, optical properties, composition, porosity and roughness of a film or stack of films. Further, the VUV techniques and apparatus may be used to characterize critical dimensions and other features of a device. The VUV reflectometer system may be utilized as a stand alone tool, or the relatively compact nature of the system may be taken advantage of such that the system is incorporated into other process tools. Thus, for example, the VUV techniques described herein may be incorporated directly into tools used for deposition, etch, photolithography, etc. so that in-line measurements, monitoring and control may be advantageously obtained.